REMARKS

Present Status of the Application

This is a full and timely response to the outstanding non-final Office Action mailed on February 24, 2004. Claims 1-33 and 35-43 remain pending of which claims 1, 5, 14, 19, 28 have been amended and claims 41-43 have been canceled to more explicitly and more clearly describe the claimed invention. It is believed that no new matter is added by way of these amendments made to the claims or specification or otherwise to the application.

The Applicants have most respectfully considered the remarks set forth in this Office Action. Regarding the obviousness rejections, it is however strongly believed that the cited references are deficient to adequately teach the claimed features as recited in the amended claims. The reasons that motivate the above position of the Applicants are discussed in detail hereafter, upon which reconsideration of the claims is most earnestly solicited.

Response to 35 U.S.C. 102 rejection

Claims 1, 2, 4-9, 14-16, 18-23, 28-33, 35-36 and 41-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Honda et al. (USP 2002/0064935 A1, Honda hereinafter).

To properly anticipate Applicants' claimed invention under 35 U.S.C. § 102, each and every element of the claim in issue must be found, "either expressly or inherently described, in a single

prior art reference." "The identical invention must be shown in as complete detail as is contained in the ...claim." Richardson v. Suzuki Motor Co., 969 F.2d 1226, 1236, 9 USPQ2D 1913, 1920 (Fed. Cir. 1989)." See M. P. E. P. § 2131, 8th ed., 2001. As described in detail hereinafter, Applicants respectfully traverse the § 102 rejection of claims because Honda does not teach every element recited in these claims.

The present invention is in general related to a method of forming bumps on a silicon wafer. More specifically, a solder bump of the instant case is formed by alloying a first solder block and a second solder block, wherein the resulting structure of the solder bump having a specified composition ratio of the material that forms the first solder block to the material that forms the second solder block. In other words, a heating process is conducted at a temperature higher than the alloying temperature for the first solder block and the second solder block to form an alloy of specified composition ratio.

In contrast, Honda teaches a method of **mounting** metal bumps 25 on the conductive bumps 28. More specifically, Honda teaches prior to the mounting of the metal bumps 25, the metal bump formation land parts 33 is subjected to an electroless Cu plating process to improve the solder wetting characteristic so that the metal bumps 25 can be fixed excellently. Alternatively, Honda teaches mounting the metal bumps 25 after a coating flux on the metal bump formation land parts 33 followed by a heat reflow process. Contrary to the Office's assertion, the reflow process of Honda does not occur at a temperature above the alloying temperature of the solder. The heat reflow process of Honda refers to the typical reflow process for profile adjustment,

wherein a metal bump is subjected to a series of highr temperatures such that only a part of the bump, normally the exterior surface of the bump, is partially melted and reflowed into a hemi-spherical shape. Therefore, even a reflow process is performed in Honda, metal bumps 25 and the conductive bumps 28 remain as two separated entities being excellently fixed to one and another as clearly shown in Figure 2Q-S2. Further, if Honda's reflow process is intended for alloying bumps into a single entity, there is no need for Honda to take extra precautions to ensure the metal bumps 25 fixed excellently to the conductive bumps 28 by plating Ni, Cu or Au, or performing coating flux on the bump formation land parts 33. In the present invention, the solder blocks are subjected to a heating process higher than the alloying temperature such that they can form an alloy with a specified composition ratio (paragraph 27). In summary, there is no explicitly teaching or implicit suggestions in Honda of the teaching of the instant case in which the first solder block and a second solder block are alloyed to form a solder bump.

Therefore, in view of the foregoing, Applicants contends that Honda fails to disclose all the features of the method as claimed in claim of the present invention. Applicants therefore respectfully request the withdrawal of the rejection under 35 U.S.C. § 102(e) of claim 1, 14 and 28 and claims 2-13, 41, 15-27, 42 and 29-40, 43 depending therefrom, respectively.

Claims 14-24, 26, 28-33, 35-37, 39 and 42 are rejected under 35 USC 102(e) as being anticipated by Chakravorty. (USPN 6350668 B1).

Applicants respectfully submit that Chakravorty is legally deficient for the purpose of anticipating claim 28 because Chakravorty fails to disclose each element of the claim under consideration and arranged as in the claim. Similar to Honda, Chakravorty teaches attaching metal bumps 314 to metal bumps 311, wherein each of the metal bumps 311, 314 will retain their structural and electrical integrity (col. 12, ln 6-16). Chakravorty teaches using a 90/10 Pb/Sn solder for the bumps 311 and a 63/37 Pb/Sn eutectic composition for the metal bumps 314 so that during the reflow process, the metal bumps 314 will simply melt and fuse to the flat bump regions 311, wherein the bumps 311 will maintain their structural and electrical integrity. In other words, the metal bumps 311, 314 of Chakravorty will not form a single solder bump alloy having at least a uniform structural integrity.

For at least these reasons, Applicants contends that Chakravorty fails to disclose all the features as claimed of the present invention. Applicants therefore respectfully request the withdrawal of the rejection under 35 U.S.C. § 102(e) of claims 14 and 28, and claims 15-27, 29-40, 42 depending therefrom.

Claims 28-33, 35 and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Fang (US 2003/0099767 A1).

Enclosed please find a CFR 1.132 declaration, executed by the inventor Jen-Kuang Fang, proving that he/she conceived or invented the subject matter disclosed in the above-mentioned

prior art and relied on in the rejection. Reconsideration and withdrawal of the rejection are courteously requested.

Response to 35 U.S.C. 103 rejection

Claims 3 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honda et al. (USP 2002/0064935 A1, Honda hereinafter) in view of Agarwala et al. (USPN 5251806, Agarwala hereinafter).

With regard to dependent claims 3 and 17, Applicants respectfully submit that these claims patentably define over the prior art for at least the same reason as independent claims 1, 14 discussed above.

The Office contends that Honda teaches substantially the claimed invention except that a Cu-Cr layer. The Office further relies on Agarwala to remedy such deficiency. However, similar to Honda, Agarwala also fails to teach or suggest forming a bump by alloying the first and the second solder blocks.

For at least these reasons, Applicants respectfully assert that claims 1 and 14 patentably define over Honda in view of Agarwala. Since claims 3 and 14 are dependent claims which further define the invention recited in claims 1 and 14, respectively, Applicants respectfully assert that these claims also are in condition for allowance. Thus, reconsideration and withdrawal of this rejection are respectively requested.

Claims 10-13, 24-27, 29 and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Honda et al. (USP 2002/0064935 A1, Honda hereinafter) in view of Sakurai (USPN 6455785).

With regard to dependent claims 10-13, 24-27, 29 and 37-40, Applicants respectfully submit that these claims patentably define over the prior art for at least the same reason as independent claims 1, 14 and 28 discussed above.

The Office contends that Sakurai teaches the wire bonding process, which is absent in Honda. Since Sakurai does not teach the solder bumps are formed by alloying two solder blocks, even Honda is combined with Sakurai, the combination still fails to render the present invention obvious. Withdrawal of the rejection is respectfully requested.

Claims 25, 27, 38 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chakravorty (USPN 6350668 B1) in view of Salmon (US 20030049886 A1).

With regard to dependent claims *25, 27, 38 and 40*, Applicants respectfully submit that these claims patentably define over the prior art for at least the same reason as independent claims 14 and 28 discussed above in the 102 rejection.

Applicants respectfully submit that Salmon's teaching fails to remedy Chakravorty's deficiency in teaching alloying the solder blocks to form solder bumps. Reconsideration and withdrawal of the rejections are courteously requested.

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CONCLUSION

For at least the foregoing reasons, it is believed that the presently pending claims 1-33, 35-40 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,

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